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CONTAMINANTS IN ONTARIO SPORT FISH - LONG TERM TRENDS AND FUTURE PROSPECTS.

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Abstract

In 1970, the Province of Ontario began analysing significant numbers of various Ontario sport fish for contaminants of importance or potential importance to human health. The collection and testing of representative samples of the edible portions of many species of fish has been carried out regularly since that time.Data for a variety of contaminants has been used to access long term temporal and spatial trends and the current status of mercury, lead, arsenic, PCB's, mirex, DDT, lindane, chlordane, HCB, OCS, toxaphene and 2,3,7,8 - TCDD (Dioxin) in Ontario fish. The future needs for analysis and criteria development are indicated.

Introduction

As we approach the 1990's, concern for the environment seems to be at an all-time high. Polls tell us that a clean environment is desired by a large majority of the voting public.

There is also the perception that the environment is considerably more polluted than it used to be. The following brief outline will attempt to summarize the status and major trends of contaminants measured in the edible portions of a number of common species of Ontario sport fish. It will also briefly look at the contaminants which will likely be of importance in the next decade.

Mercury

In 1970, anglers in Ontario became aware of the pollution of a number of prime fishing waters with discharges of mercury from chlor-alkali plants in several locations. The fishery of Lake St. Clair was considerably affected by the discharge of mercury from the Dow Chemical Co. near Sarnia. Figure 1a shows the results of annual monitoring for mercury in walleye (Stizostedion vitreum) from Lake St. Clair.

Figure 1b shows a similar, if not so dramatic a decline for walleye from L. St. Francis on the lower St. Lawrence.

The significance of the decline in mean mercury content on the suitability of fish for human consumption can be gauged by Figure 2 which shows the consumption advisory curves for L. St. Clair walleye for five years from 1970 to 1988. In 1970, nearly all sizes of walleye contained over 1.5 ppm mercury and were therefore unsuitable even for very limited consumption. By 1988 nearly all sizes of walleye caught were found to contain less than 0.5 ppm mercury, the limit for commercial sale in Canada.

PCB

Figures 2a, 2b and 2c show the decline in PCB in Coho Salmon (Oncorhynchus kisutch) and Rainbow Trout (Oncorhynchus mykiss) in Lake Ontario and Coho Salmon from Lake Erie since the 1970s. Current rates of decline are relatively slight. The present PCB level in Lake Erie Coho is about one-third that of the same species in Lake Ontario.

Figures 3a and 3b show the Trends in PCB in Lake Trout (Salvelinus namaycush) from Southern Lake Huron and Western Lake Superior.

Figure 3c shows the modeled PCB concentration in Various sizes of Chinook Salmon (Oncorhynchus tshawytscha) from six locations; Lakes Ontario, Huron, Michgan and Superior, and from Georgian Bay on Lake Huron and from Green Bay on Lake Michigan. Only the larger sizes of Lake Ontario, Lake Michigan and Green Bay Chinook Salmon exceed the Health & Welfare Canada 2.0 ppm PCB fish consumption criterion.

Figure 4a compares the PCB levels in various sizes of Walleye from the Bay of Quinte on Lake Ontario and from Green Bay on Lake Michgan. Only the larger Walleye from Green bay exceed the @.0 ppm PCB fish consumption criterion.

Mirex

Figures 4b and 4c show the mirex trends for Coho Salmon and Rainbow Trout from Lake Ontario. While there has been little trend in mirex levels in Coho, the Rainbow Trout trend has been a similar decline pattern to those seen for PCB.

Chlordane

Figure 5a shows the decline in Chlordane levels in Lake Ontario Coho Salmon after the removal of this pesticide from the agricultural market in the late 1970s.

DDT

Figure 5b shows the decline of DDT in Lake Simcoe Lake Trout since the cessation in use of this pesticide in the 1960s.

Lead

Figure 5c presents the lead levels for three species of fish from the St. Lawrence river. The source, a company manufacturing tetra-ethyl lead for addition to gasoline, discontinued manufacture in 1985. The reductions in 1984 from the uncontrolled 1983 situation were the result of efforts to control the loss of tetra-ethyl lead to the St. Lawrence river during manufacture. The 1986 levels represent natural background levels of lead in fish flesh.

Discussion

While many contaminants have shown significant declines in the environment, as measured by their concentrations in the edible portions of Ontario sport fish, some locations still contain fish with levels which would indicate the need to control, or improve the control of, sources of PCB and mirex. Other potential contaminants, such as HCB, OCS, the chlorinated phenols and chlorinated benzenes and the PAHs await the development of assessment criteria before their significance in edible portions of Ontario's sport fish can be properly evaluated.

Figure 1a

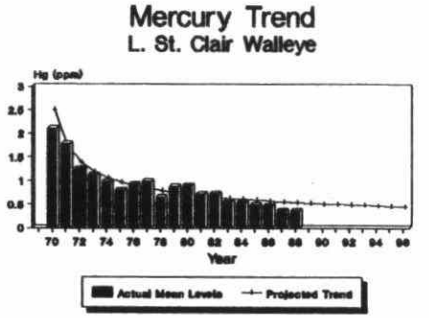


Figure 1b

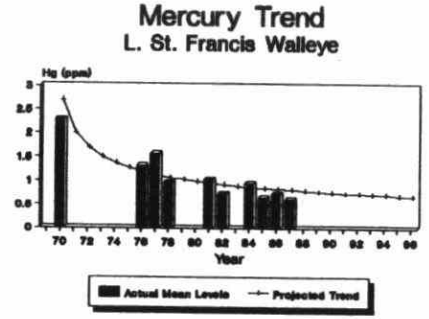


Figure 1c

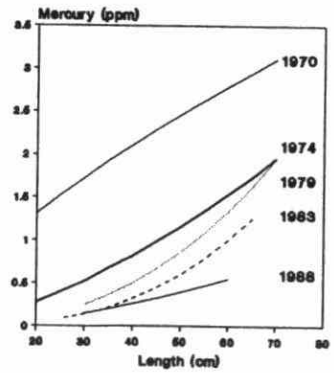


Figure 2a

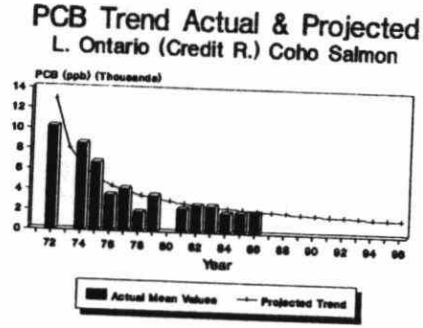
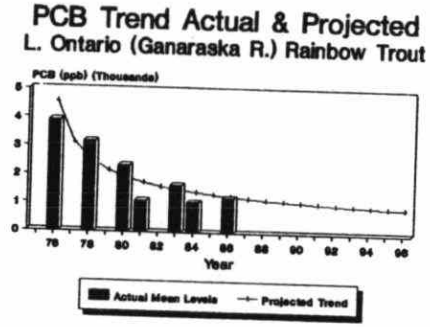


Figure 2b



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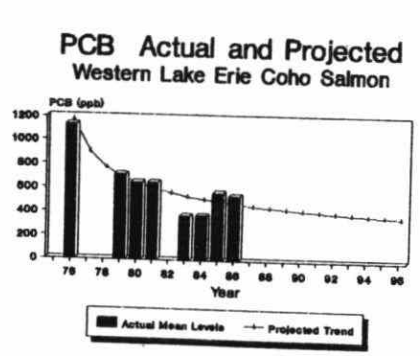

Figure 3a

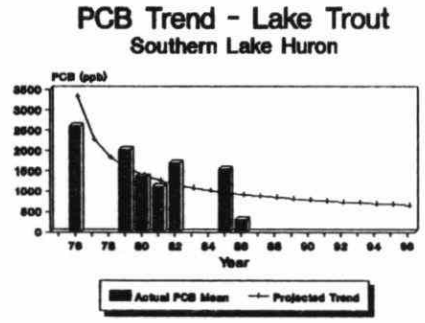

Figure 3b

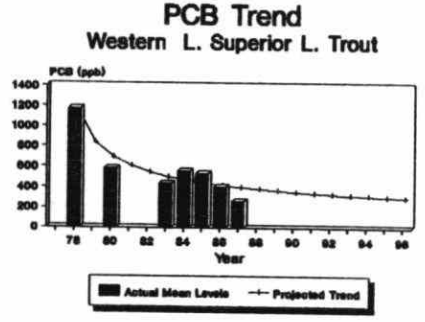

Figure 3c

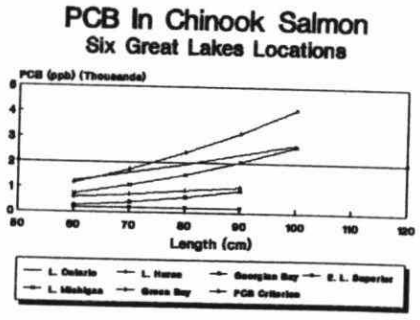

Figure 4a

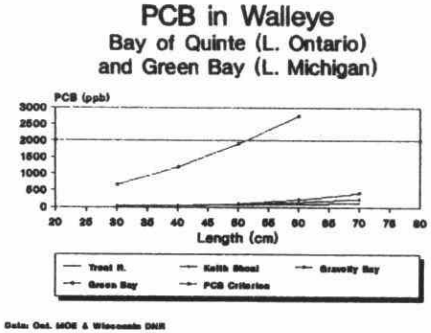

Figure 4b

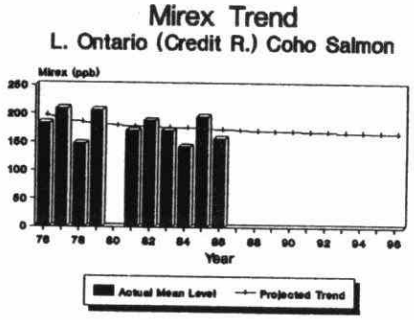

Figure 4c

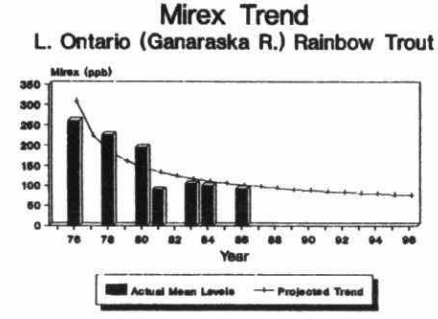

Figure 5a

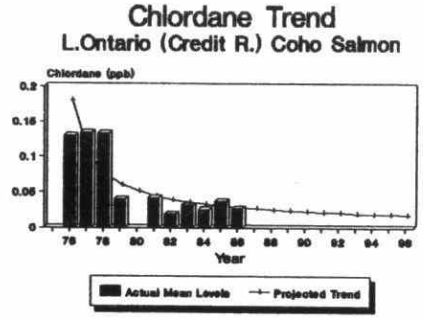

Figure 5b

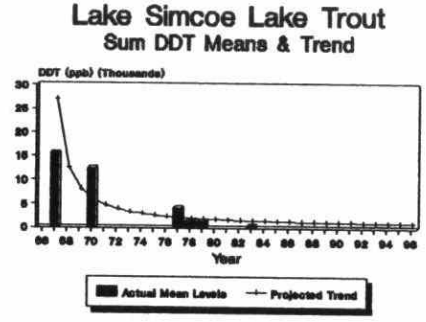

Figure 5c